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IN THE CLAIMS

Please cancel claims 1-52 without prejudice or disclaimer.

Please add the following new claims 53-104.

53. (New) An ionic conducting membrane comprising:

a membrane having opposing surfaces and a thickness between said surfaces, said membrane including a polymerization product of

one or more monomers selected from the group of water-soluble, ethylenically-unsaturated acids and acid derivatives; and

a crosslinking agent,

wherein a first solution is used for polymerizing the membrane to the thickness; and

wherein at least a portion of said first solution is species replaced with a second solution characterized by an alkaline component.

54. (New) The ionic conducting membrane as in claim 53, said membrane further comprising a water-soluble or water-swellable polymer.

55. (New) The ionic conducting membrane as in claim 53, said membrane further comprising a chemical polymerization initiator.

56. (New) The ionic conducting membrane as in claim 53, said membrane further comprising:

a water-soluble or water-swellable polymer; and

a chemical polymerization initiator.

57. (New) The ionic conducting membrane as in claim 53, said membrane further comprising a neutralizing agent.

58. (New) The ionic conducting membrane as in claim 53, further wherein the thickness of the membrane after species replacement deviates from the thickness of the membrane before species replacement by less than about 50%.

59. (New) The ionic conducting membrane as in claim 53, further wherein the thickness of the membrane after species replacement deviates from the thickness of the membrane before species replacement by less than about 20%.

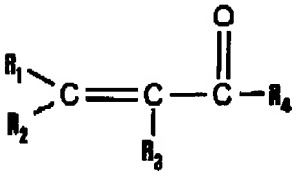
58. (New) The ionic conducting membrane as in claim 53, further wherein the thickness of the membrane after species replacement deviates from the thickness of the membrane before species replacement by less than about 5%.

59. (New) The ionic conducting membrane as in claim 53, wherein water comprises about 50% to about 90%, on a weight basis, of the membrane.

60. (New) The ionic conducting membrane as in claim 53, wherein water comprises about 60% to about 80%, on a weight basis, of the polymer matrix material.

61. (New) The ionic conducting membrane as in claim 53, wherein water comprises about 62% to about 75%, on a weight basis, of the polymer matrix material.

62. (New) The ionic conducting membrane as in claim 53, wherein the water soluble ethylenically unsaturated acids and acid derivatives have the general formula:



wherein R1, R2, and R3 are independently selected from the group consisting of H, C, C2-C6 alkanes, C2-C6 alkenes, C2-C6 alkynes, aromatics, halogens, carboxylic acid derivatives, sulfates and nitrates; and

R4 is selected from the group consisting of NR5, NHR5, NH2, OH, H, halides, OR5, and carboxylic acid derivatives, wherein R5 is selected from the group consisting of H, C, C2-C6 alkanes, C2-C6 alkenes, C2-C6 alkynes, and aromatics.

63. (New) The ionic conducting membrane as in claim 53, wherein the water soluble ethylenically unsaturated acids and acid derivatives are selected from the group consisting of methylenebisacrylamide, acrylamide, methacrylic acid, acrylic acid, fumaramide, fumaric acid, N-isopropylacrylamide, N, N-dimethylacrylamide, 3,3-dimethylacrylic acid, maleic anhydride, and combinations comprising at least one of the foregoing ethylenically unsaturated acids and derivatives.

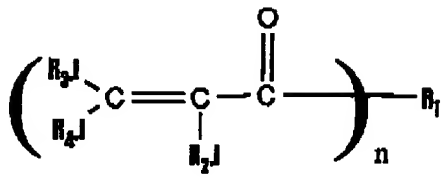
64. (New) The ionic conducting membrane as in claim 53, wherein the water soluble ethylenically unsaturated acids and acid derivatives are selected from the group consisting of 1-vinyl-2-pyrrolidinone, the sodium salt of vinylsulfonic acid, and combinations comprising at least one of the foregoing ethylenically unsaturated acids and derivatives.

65. (New) The ionic conducting membrane as in claim 53, wherein the ethylenically unsaturated acids or acid derivatives comprises about 5% to about 50%, by weight, of the total monomer solution prior to polymerization.

66. (New) The ionic conducting membrane as in claim 53, wherein the ethylenically unsaturated acids or acid derivatives comprises about 7% to about 25%, by weight, of the total monomer solution prior to polymerization.

67. (New) The ionic conducting membrane as in claim 53, wherein the ethylenically unsaturated acids or acid derivatives comprises about 10% to about 20%, by weight, of the total monomer solution prior to polymerization.

68. (New) The ionic conducting membrane as in claim 53, wherein the crosslinking agent is of the general formula:



wherein i=1 → n, and n≥2;

R2,i, R3,i, and R4,i are independently selected from the group consisting of H, C, C2-C6 alkanes, C2-C6 alkenes, C2-C6 alkynes, aromatics, halogens, carboxylic acid derivatives, sulfates and nitrates;

R1 is selected from the group consisting of N, NR5, NH, O, and carboxylic-acid derivatives, wherein R5 is selected from the group consisting of H, C, C2-C6 alkanes, C2-C6 alkenes, C2-C6 alkynes, and aromatics.

69. (New) The ionic conducting membrane as in claim 53, wherein the crosslinking agent is selected from the group consisting of methylenebisacrylamide, ethylenebisacrylamide, any water-soluble N,N'-alkylidene-*bis*(ethylenically unsaturated amide), 1,3,5-Triacryloylhexahydro-1,3,5-triazine, and combinations comprising at least one of the foregoing crosslinking agents.

70. (New) The ionic conducting membrane as in claim 53, wherein the crosslinking agent comprises about 0.01% to about 15%, by weight, of the total monomer solution prior to polymerization.

71. (New) The ionic conducting membrane as in claim 53, wherein th_ crosslinking agent comprises about 0.5% to about 5%, by weight, of the total monomer solution prior to polymerization.

72. (New) The ionic conducting membrane as in claim 53, wherein the crosslinking agent comprises about 1% to about 3%, by weight, of the total monomer solution prior to polymerization.

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73. (New) The ionic conducting membrane as in claim 1, wherein the alkaline component comprises KOH.

74. (New) The ionic conducting membrane as in claim 73, wherein the conductivity is greater than about 0.1 Siemens per centimeter.

75. (New) The ionic conducting membrane as in claim 73, wherein the conductivity is greater than about 0.2 Siemens per centimeter.

76. (New) The ionic conducting membrane as in claim 73, wherein the conductivity is greater than about 0.4 Siemens per centimeter.

77. (New) The ionic conducting membrane as in claim 54, wherein the water-soluble or water-swellable polymer is selected from the group consisting of polysulfone (anionic), poly(sodium-4-styrenesulfonate), carboxymethyl cellulose, polysulfone (anionic), sodium salt of poly(styrenesulfonic acid-co-maleic acid), corn starch, any other water-soluble or water-swellable polymers, and combinations comprising at least one of the foregoing polymers.

78. (New) The ionic conducting membrane as in claim 54, wherein the water-soluble or water-swellable polymer comprises less than about 30%, by weight, of the membrane.

79. (New) The ionic conducting membrane as in claim 54, wherein the water-soluble or water-swellable polymer comprises about 1% to about 10%, by weight, of the membrane.

80. (New) The ionic conducting membrane as in claim 54, wherein the water-soluble or water-swellable polymer comprises about 1% to about 4%, by weight, of the membrane.

81. (New) The ionic conducting membrane as in claim 56, wherein the water-soluble or water-swellable polymer is selected from the group consisting of polysulfone (anionic), poly(sodium-4-styrenesulfonate), carboxymethyl cellulose, polysulfone (anionic), sodium salt of poly(styrenesulfonic acid-co-maleic acid), corn starch, any other water-soluble or water-swellable polymers, and combinations comprising at least one of the foregoing polymers.

82. (New) The ionic conducting membrane as in claim 56, wherein the water-soluble or water-swellable polymer comprises less than about 30%, by weight, of the membrane.

83. (New) The ionic conducting membrane as in claim 56, wherein the water-soluble or water-swellable polymer comprises about 1% to about 10%, by weight, of the membrane.

84. (New) The ionic conducting membrane as in claim 56, wherein the water-soluble or water-swellable polymer comprises about 1% to about 4%, by weight, of the membrane.

85. (New) The ionic conducting membrane as in claim 55, wherein the chemical polymerization initiator is selected from the group consisting of ammonium persulfate, alkali metal persulfates and peroxides, and combinations comprising at least one of the foregoing initiators.

86. (New) The ionic conducting membrane as in claim 55, wherein the chemical polymerization initiator comprises less than about 3%, by weight, of the membrane.

87. (New) The ionic conducting membrane as in claim 56, wherein the chemical polymerization initiator is selected from the group consisting of ammonium persulfate, alkali metal persulfates and peroxides, and combinations comprising at least one of the foregoing initiators.

88. (New) The ionic conducting membrane as in claim 56, wherein the chemical polymerization initiator comprises less than about 3%, by weight, of the membrane.

89. (New) The ionic conducting membrane as in claim 53, further comprising a substrate.

90. (New) The ionic conducting membrane as in claim 89, wherein the substrate comprises polyolefin, polyvinyl alcohol, cellulose, or polyamide.

91. (New) The ionic conducting membrane as in claim 53, wherein said membrane is polymerized in situ on an electrode.

92. (New) A method of making an ionic conducting membrane comprising:

polymerizing an aqueous solution of one or more monomers selected from the group of water-soluble, ethylenically-unsaturated acids and acid derivatives and a crosslinking agent, and

replacing a portion of the water of the aqueous solution with an alkaline solution,

wherein the membrane is swelled to a thickness upon curing prior to replacing a portion of water of the aqueous solution with the alkaline solution.

93. (New) The method as in claim 91, wherein the polymerization is carried out at a temperature ranging from room temperature to about 130° C.

94. (New) The method as in claim 91, wherein the polymerization is carried out at a temperature ranging from about 75° to about 100° C.

95. (New) The method as in claim 91, wherein the polymerization is carried out using radiation in conjunction with heating.

96. (New) The method as in claim 91, wherein the polymerization is carried out using radiation.

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97. (New) The method as in claim 95, wherein the radiation source is selected from the group consisting of ultraviolet light, gamma rays, x-rays, electron beam, and a combination of at least one of the foregoing radiation sources.

98. (New) The method as in claim 91, wherein the aqueous solution further comprises a chemical polymerization initiator.

99. (New) The method as in claim 91, wherein the quantity and concentration of the alkaline solution is selected such that the thickness of the membrane after species replacement deviates from the thickness of the membrane before species replacement by less than about 50%.

100. (New) The method as in claim 91, wherein the quantity and concentration of the alkaline solution is selected such that the thickness of the membrane after species replacement deviates from the thickness of the membrane before species replacement by less than about 20%.

101. (New) The method as in claim 91, wherein the quantity and concentration of the alkaline solution is selected such that the thickness of the membrane after species replacement deviates from the thickness of the membrane before species replacement by less than about 5%.

102. (New) The method as in claim 91, wherein polymerization is carried out on a substrate.

103. (New) The method as in claim 102, wherein the substrate comprises polyolefin, polyvinyl alcohol, cellulose, or polyamide.

104. (New) The method as in claim 91, wherein polymerization is carried out in situ on an electrode.